Chapter 1

- R Studio

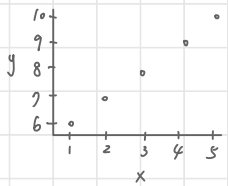
  A free, open source intergrated development environment or IDE for R

  Help keep R more organized and it adds more functionally to it.

- Draw a plot

```
> x <- 1:5
> y <- 6:10
> plot(x,y)
```

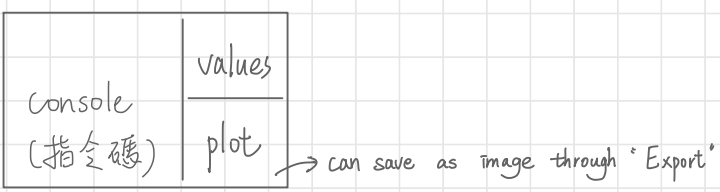
⇒



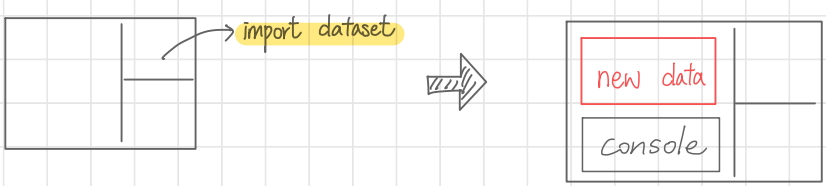
- What's in R's working memory

```
> ls( )
[1] "x" "y"
```

↳ in R studio



- Importing Data into R using RStudio



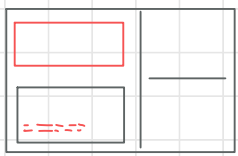
- Create and managing Scripts in RStudio

  - File > New file > R script

```
# create a new variable
z <- 11:15
# add up x, y, z
sum (x, y, z)
```

  - Run

  - [1] 120



    - File > Save As .....
      - can reproduce our analysis on any given day

- Writing Scripts in R

  - File > New file > R markdown
    - allow to embed (嵌入) R code and R output directly into .doc , .pdf , .html ...

  - File > New Project
    - allow to manage all your files and output related to a project in one spot.

- Arithmetic functions in R

(I)

```
> x=11
>
> print (x)
[1] 11
>
> X        (大小寫差異)
> Error : object "X" not found
```

Ⅱ

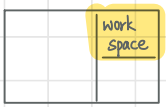
```
> y <- 7
> y
[1] 7
>
> y <- 9
> y
[1] 9
```

易被覆蓋

Ⅲ

```
> ls()
[1] "x" "y"
```

或



could know everything that are stored in the work space memory

Ⅳ

```
>
> rm(y)
```

↳ remove "y" memory

```
> y
Error: object "y" not found
```

Ⅴ

```
> x.1 <- 14
> x.1
[1] 14
> 1x <- 22
```

number can't be the first of the object name

```
Error: unexpected symbol in "1x"
```

Ⅵ

```
> xx <- "marin"
> xx
```

↳被視為文字

```
[1] "marin"
> yy <- "1"
> yy
```

↳被視為文字而非數字

```
[1] "1"
```

Ⅶ

```
> 11+14
[1] 25
> 6*8
[1] 48
```

Ⅷ

> x
[1] 11
> y
[1] 9
> x+y
[1] 20

Also

> z ← x+y
> z
[1] 20
> x-y
[1] 2

可作代數之 +/-/*/÷/square / sqrt(x) / log(y) / exp(x) / log2(y)
(x,y)

Ⅸ

> abs(-14) 絕對值
[1] 14

Ⅹ

> sqrt(y)

十 ↳ 表未完成之 code

十) ↳ 直到補上
[1] 3 ↳ 才給 Ans

上 方向鍵：顯示先前運算們

> the code below is for …
Error : unexpected symbol in " the code "
> # the code below is for…
↳ 才能不 Error，若之後寫更長 code 會用到（codes reminding）

1.4-1.7 (1% HW)

- create vector、matrices

```
> x = 11
> x <- 11
```
指定 x 值

```
> x1 <- c(1,3,5,7,9)
```
向量，也可用 character 儲存


```
> gender <- c("male", "female")
```

```
> 2:7
[1] 2 3 4 5 6 7
```
: 創造整數連續數列

```
> seq(from=1, to=7, by=1)
```
創造數列
首項 末項 公差，可以是分數、小數

```
> rep(1, times=10)
```
要repeat的東西，可以是 1, "f", 1:3, seq(from=2, to=5, by=0.25), c("male", "female")
1 2 3 1 2 3 ...

```
> x <- 1:5
> x
[1] 成果
```
x：數列
可被同+, -, *, ÷

if two vectors are of the same length we can +/-/*/÷ corresponding elements.
x+y, x-y, x*y, x/y

```
> y[3]
[1] 5
```
y數列的3rd數

```
> y[-3]
[1] 1 3 7 9
```
y數列除了3rd以外的其他元素

```
> y[1:3]
[1] 1 3 5
```
1st ~ 3rd 項

```
> y[c(1,5)]
[1] 1 9
```
1st 和 5th 項

```
> y[-c(1,5)]
[1] 3 5 7
```
除了 1st 和 5th

```
> y[y<6]
[1] 1 3 5
```
y數列中小於6的項

```
> matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=TRUE)
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
[3,]    7    8    9
```
row 列

必大寫，讓R以行列出

column 欄 (柱子)

```
> matrix(c(1,2,3,4,5,6,7,8,9), nrow=3, byrow=FALSE)
     [,1] [,2] [,3]
[1,]    1    4    7
[2,]    2    5    8
[3,]    3    6    9
```

```
> mat <- matrix(..., byrow=TRUE)
> mat[1,2]
[1] 2
```
row column
橫列 直欄

```
> mat[c(1,3), 2]
[1] 2 8
```

```
> mat[2,]
[1] 4 5 6
```

```
> matrix[, 1]
[1] 1 4 7
```
可以做矩陣元素的同加減乘除

Importing data from Excel into R (.csv / .txt)

better

```
> help(read.csv)
> ?read.csv
```
用來查看說明

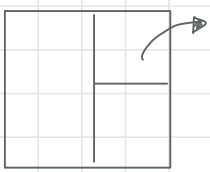
法I
```
> data1 <- read.csv(file.choose(), header=T)
```
header=T：1st列是標題，否則寫F

開.csv檔

↳ we need to specify the path to find the file

```
> data1
```

	A	B	C	...	F
1					
2					
⋮					
10					



data1 10 obs. of 6 variables

1~10　A~F

obs = observation

法II
```
> data2 <- read.table(file.choose(), header=T, sep=",")
> data2 (同上表)
```
開.csv檔

↳ the data value are separated

讀取不規則數據

法III
```
> data3 <- read.delim(file.choose(), headers=T)
```
tab-delimited

開.txt檔

```
> data4 <- read.table(file.choose(), headers=T, sep="/t")
```
↳ tab-delimited file

可以嵌入 URL 、 .xlsx

如果有兩個 worksheet → 預設開1st

可以選要匯入第n行到第n行；第n列到第n列

```
> write.table(DataToExport, file="....", sep=",")
```
↳輸出　↳檔名　↳ to specify the file format